REMARKS

Amendment to Claims

In this Amendment, Applicants are amending independent Claims 3-8, canceling Claims 1, 2, 9-19, 26, 33, 40, 47, 54, 61, 68, 76, 83, 89, 90, 97, 98, 105, 106, 113, 114, 121, 122, 129, 130, 137, 138, 145 and 146 and adding new Claims 154-159.

More specifically, independent Claims 5 and 7 have been amended to delete the feature of each of said pixels comprising at least first and second thin film transistors and a pixel electrode wherein a gate electrode of the first thin film transistor is electrically connected to a gate line and a gate electrode of the second thin film transistor is electrically connected to a drain region of the first thin film transistor, and the pixel electrode is electrically connected to one of source and drain regions of the second thin film transistor.

Independent Claims 3-8 have been amended to delete the feature of each step of a voltage level for said voltage gray scale method is designated as $(VH-VL)/2^n$, where VH is the highest voltage level of voltages inputted to a D/A converter circuit, and VL is the lowest voltage level of voltages inputted to said D/A converter circuit. This feature has been added to new dependent Claims 154-159.

Applicants will address each of the Examiner's rejections in the order in which they appear in the Office Action.

Claim Rejections - 35 USC §103

Claims 1, 5, 10, 11, 29 and 36

In the Office Action, the Examiner rejects Claims 1, 5, 10, 11, 29 and 36 under 35 USC §103(a) as being unpatentable over Okada et al. (US 5,673,061) in view of Matsueda et al. (US 6,380,917) and Nakai et al. (US 6,072,454). This rejection is respectfully traversed.

As explained above, independent Claim 1 has been canceled, rendering the rejection of that claim moot.

With regard to independent Claim 5, this claim recites that an image is displayed by an image gray scale of $(2^m-(2^{m-n}-1))$ patterns, where m and n are integers equal to or larger than 2 and satisfy m>n.

The Examiner admits that neither Okada, Matsueda, nor Nakai teach an image gray scale of $(2^m-(2^{m-n}-1))$ patterns. The Examiner, however, contends that the formula of Claim 5 is identical to the Okada formula. Applicants respectfully disagree.

(1) The formula in Okada of $2^X(2^y-1)$ represents the numbers of the intermediate voltage. In contrast, the formula of independent Claim 5 of $2^m-(2^{m-n}-1)$ represents the numbers of the gray scale. These are two distinct things. It is improper to compare the numbers of the intermediate voltage with the number of the gray scale. They are not the same, and the Examiner has made no showing that they are the same.

In contrast to the Examiner's improper focus on the numbers of the intermediate voltage, The correct focus is to compare the numbers of gray scale between Okada and the present application. The number of gray scale in Okada is $2^{(x+y)}$ (see col. 15, line 54 in Okada), and the number of gray scale in Claim 5 of the present application is $2^m-(2^{m-n}-1)$, wherein, m represents the number of bits inputted from an external, n and x represent the number of bits used in the voltage gray scale, and y represents the number of bits used in time ratio gray scale.

$2^m-(2^{m-n}-1)$

$= 2^{x+y}-(2^y-1)$ ($\because m = x+y,\ m-n = y$)

$= 2^{x+y}-2^y+1 < 2^{x+y}$ ($\because$ n is an integer equal to or larger than 2, and m>n, thereby becomes y>1)

$\therefore 2^m-(2^{m-n}-1) \neq 2^{x+y}$

Therefore, the number of gray scale in Claim 5 the present application is different from the number of gray scale in Okada. Hence, Okada (and the other cited references) cannot disclose or suggest the device of independent Claim 5.

(2) The Examiner also contends that x equals m-n; y equals n. This is incorrect. Rather, x represents the number of bits which is used in the voltage gray-scale, and y represents the number of bits which is used in time ratio gray-scale in Okada. Therefore, x equals n; y equals m-n is correct. Applicants note that Claim 5 recites that n bit information out of m bit digital video data inputted from an external is used for a voltage gray scale method and (m-n) bit information is used for a time ratio gray scale method. In the first hypothetical example given by the Examiner on page 4, lines 18-21 of the Office Action, the Examiner sets m = 6 and n = 3 which leads to x=y =3. In this example, the result is the same as the Office Action, because x and y are equivalent. However, in the second hypothetical example given by the Examiner on page 4, line 21 to page 5, line 2 of the Office Action, the Examiner sets m = 5 and n = 2 which leads x = 2 and y = 3.Hence, in this example, the formula of Okada is $2^x(2^y-1) = 2^2(2^3-1) = 28$ and the formula of claim 5 is $2^m - (2^{m-n}-1) = 2^5-(2^{5-2}-1) = 32-(8-1) = 25$. Therefore, the formula of Okada and that of Claim 5 are not identical but differ from each other. Hence, Okada (and the other cited references) does not disclose this claimed feature of Claim 5.

Accordingly, it is respectfully submitted that none of the cited references disclose or suggest the device of Claim 5. Therefore, independent Claim 5 and those claims dependent thereon are patentable over the cited references, and it is respectfully requested that this rejection be withdrawn.

Claims 2, 6, 26, 30, 33 and 37

The Examiner further rejects Claims 2, 6, 26, 30, 33 and 37 under 35 USC §103(a) as being unpatentable over Okada et al. in view of Matsueda et al. and further in view of Yasunishi

(US 6,094,243). This rejection is also respectfully traversed.

As explained supra, Claim 2 has been canceled, rendering the rejection of that claim moot.

Independent Claim 6 defines an image gray scale of 2^m-(2^{m-n}-1)) patterns. Hence, for the reasons discussed above for Claim 5, independent Claim 6 is also not disclosed or suggested by the cited references.

Accordingly, independent Claim 6 and those claims dependent thereon are patentable over the cited references, and it is respectfully requested that this rejection be withdrawn.

Claims 3, 27 and 34

The Examiner further rejects Claims 3, 27 and 34 under 35 USC §103(a) as being unpatentable over Okada et al., Matsueda et al, Nakai et al. and further in view of Yamazaki et al. (US 6,335,716). This rejection is also respectfully traversed.

Independent Claim 3 recites the feature that a display device has a circuit which converts m bit digital video data inputted from an external into n bit digital video data and provides said n bit digital video data to said source driver, where said m and said n are integers equal to or larger than 2 and satisfy m>n, wherein said circuit is formed over said substrate. There appears to be no discussion in the Office Action as to where this feature is allegedly disclosed or suggested in the cited references. Hence, no prima facie case of obviousness has been established.

Therefore, independent Claim 3 and those claims dependent thereon are patentable over these cited references, and it is respectfully requested that this rejection be withdrawn

Claims 4, 8, 28, 32, 35 and 39

The Examiner further rejects Claims 4, 8, 28, 32, 35 and 39 under 35 USC §103(a) as being unpatentable over Okada et al., Matsueda et al, and Yasunishi and further in view of

Yamazaki et al. (US 6,335,716). This rejection is also respectfully traversed.

For at least the reasons discussed above for independent Claim 3, these claims are also patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 7, 31 and 38

The Examiner also rejects Claims 7, 31 and 38 under 35 USC §103(a) as being unpatentable over Okada et al. in view of Matsueda et al. and Nakai et al. and further in view of Yamazaki et al. This rejection is also respectfully traversed.

For at least the reasons discussed above, each of these claims is also patentable over the cited references, and it is requested that this rejection be withdrawn.

Claims 12-17, 40-74, 76-82 and 89-152

The Examiner further rejects Claims 12-17, 40-74, 76-82 and 89-152 under 35 USC §103(a) as being unpatentable over Yamazaki et al. or Holmes et al, or Kimura, or Munyan, or Stambolic et al., or Kleinschmidt et al., or Sato, or Yun et al. in view of Okada et al., Nakai et al. and Matsueda et al. or Okada et al., Matsueda et al., and Yasunishi or Okada et al., Matsueda et al. Yasunishi and Yamazaki or of Okada et al., Matsueda, Nakai et al. and Yamazaki. This rejection is also respectfully traversed.

Each of these claims is a dependent claim. Accordingly, for at least the reasons discussed above for the independent claims, these claims are also patentable over the cited references, and it is requested that this rejection be withdrawn.

Claims 9 and 19-25

The Examiner further rejects Claims 9 and 19-25 under 35 USC §103(a) are rejected as being unpatentable over Okada et al., and Matsueda et al, and Nakai et al. or of Okada et al., Matsueda et al., and Yasunishi, or of Okada et al., Matsueda et al., Yasunishi, and Yamazaki, or of Okada et al., Matsueda et al., nakai et al. and Yamazaki and further in view of Wu et al (US 6,254,256). This rejection is also respectfully traversed.

Each of these claims is a dependent claim. Accordingly, for at least the reasons discussed above for the independent claims, these claims are also patentable over the cited references, and it is requested that this rejection be withdrawn.

Claims 18, 84-88 and 153

The Examiner further rejects Claims 18, 84-88 and 153 under 35 USC §103(a) as being unpatentable over Okada et al., Matsueda et al, and Nakai et al. or of Okada et al., Matsueda et al., and Yasunishi or of Okada et al., Matsueda et al., Yasunishi, and Yamazaki or of Okada et al., Matsueda et al., Nakai et al. and Yamazaki and further in view of Bhargava (US 5,455,489). This rejection is also respectfully traversed.

Each of these claims is a dependent claim. Accordingly, for at least the reasons discussed above for the independent claims, these claims are also patentable over the cited references, and it is requested that this rejection be withdrawn.

Therefore, for at least the above-stated reasons, it is respectfully submitted that all of the pending claims are patentable over the cited references, and it is requested that each of the §103 rejections be withdrawn.

Conclusion

It is respectfully submitted that the present application is now in a condition for allowance and should be allowed.

Please charge our deposit account 50/1039 for any further fee for this amendment.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

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